filled by the second, and $\left(1-\frac{my}{nx}\right)y$ the time which it would take it.

$\therefore\ \frac{my}{n}+\left(1-\frac{my}{nx}\right)y=$time in which the vessel would be filled. Since $\frac{xy}{x+y}$ is the time during which the vessel would be filled were both pipes kept open,

$$\therefore\ \frac{my}{n}+\frac{(nx-my)y}{nx}=\frac{xy}{x+y}+t\ldots.(1).$$

If both pipes had been kept open during the time $\frac{xy}{x+y}$, $\frac{y}{x+y}$ would have been the part of the vessel filled by the first pipe,

$$\therefore\ \frac{y}{x+y}=\frac{p}{q}\left(1-\frac{my}{nx}\right)\ldots.(2).$$

Reducing the equation (2), we get $mpy^2+(mp+nq-np)xy-npx^2=0$.

Solving this with reference to y, a mere quadratic, we get y expressed by x. Let us, for the sake of brevity, put $y=rx$. Substituting this in (1), we obtain a simple equation in x, whence,

$$x=\frac{nt(1+r)}{(m+nr-mr^2)r},\quad y=\frac{nt(1+r)}{m+nr-mr^2}.$$

Solved also by Professor *Whitaker* and the *Proposer*.

7. Proposed by O. S. KIBLER, Superintendent of Schools, West Middleburg, Logan County, Ohio.

A's age equals *B*'s age plus the cube root of *C*'s age; *B*'s age equals *C*'s age plus the cube root of *A*'s age plus 14 years; and, *C*'s age equals the cube root of *A*'s age plus the square root of *B*'s age. What is the age of each?

Solution by J. F. W. SCHEFFER, A. M., Hagerstown, Maryland, and H. C. WHITAKER, B. S., M. E., Philadelphia, Pennsylvania.

Denoting by x^3, y^2, z^3, respectively, the ages of A, B, C, we have the equations $x^3=y^2+z\ldots.(1)$, $y^2=z^3+x+14\ldots.(2)$, $z^3=x+y\ldots.(3)$. By adding (2) and (3) we get $x=\frac{1}{2}(y^2-y-14)$, and from (1), $z=\frac{1}{8}(y^2-y-14)^3-y^2$. Substituting these two values in (3), we get an equation of the 18th degree, which it would be a piece of folly to solve, since the only rational values of x, y, z, viz.; $x=3$, $y=5$, $z=2$, can with little trouble be obtained from the original equations.

8. Proposed by H. M. CASH, Salesville, Ohio.

The longer side BC of a field in the form of a parallelogram is a (78) rods; the sum of its shorter side AB, and greater diagonal AC is b (114) rods; the distance from B at right angles with AB to a tree standing on AC, is c (32) rods. Find the area of the field, and the distance from the tree to the corners A, C, and D.

Solution by H. C. WHITAKER, B. S., M. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

Denote the position of the tree by T, the distance AT by x, CT by y, and AB by $b-x-y$.

$$\text{Now } x=\frac{c}{\cos ATB}=-\frac{c}{\cos BTC}=\frac{2c^2y}{a^2-c^2-y^2}.$$

$$\text{Also } x^2=c^2+(b-x-y)^2, \text{ whence } x=\frac{b^2+c^2-y^2-2by}{2b-2y}.$$

Equating these values of x gives,

$y^4-2by^3+(b^2-a^2-2c^2)y^2+2b(a^2+c^2)-(a^2-c^2)(b^2+c^2)=0$. Substituting the

given values of a, b, and c, $y^4-228y^3+4864y^2+1620624y-70941200=0$.

Whence $y=50$ and $x=40$.

$$DT=\sqrt{(24^2+50^2-2\times50\times24\times.6)}=\sqrt{1636}-40.4474 \text{ rds.}$$

$$\text{Area}=2\sqrt{96\times18\times72\times6}=2\times4\times6\times2\times18=1728 \text{ sq. rds.}$$

Solved by Professor *Scheffer*. An excellent trigonometrical solution was also received from *W. L. Harvey*, Portland, Maine.

PROBLEMS.

14. Proposed by SYLVESTER ROBINS, North Branch Depot, New Jersey.

In copying the following example, the class lost the coefficient of x in the equation:

$$\sqrt{x}+\sqrt[3]{y}=x\ldots.(1).$$

$$\sqrt{x^3}+\sqrt[3]{x^2}=(\ \ )x\ldots.(2),$$

and then set themselves to finding coefficients for the vacancy, which would allow rational values to x and y.

15. Proposed by SETH PRATT, C. E., Assyria, Michigan.

From a point in an equilateral triangle, the distances to the angles are, respectively, 20, 28, and 31 rods. Required a side of the triangle.

16. Proposed by COLMAN BANCROFT, Professor of Mathematics, Hiram College, Hiram, Ohio.

A traveller whose speed constantly increases in a geometrical progression passes A at 2 o'clock, B at 3:30, C at 4:30, and D at 6:18. At B he is moving at the rate of 12 miles per hour, and at C 18 miles. Find his rate at A and D, and the distance from A to each of the points B, C, and D.

17. Proposed by G. B. M. ZERR, A. M., Principal of Schools, Staunton, Virginia.

A sum of P dollars is loaned at r per cent. interest. At the end of the first year a payment of x dollars is made; and at the end of each following year the payment is made greater by m per cent. than the preceding year. If the sum is paid in n payments, find x.

18. Proposed by WILLIAM E. HEAL, Member of the London Mathematical Society, Marion, Indiana.

Two railroad trains, lengths m and n, meet at a siding, length l. How shall the trains pass if $l<m<n$?

Solutions to these problems should be received on or before May 1st.

GEOMETRY.

Conducted by B. F. FINKEL, Kidder, Missouri. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

2. Show that $\frac{1}{2}\pi=\left[\frac{2.\ 4.\ 6.\ 8.\ 10}{1.\ 3.\ 5.\ 7.\ 9}\ldots.\right]^{\frac{2}{\infty}}$, *Wallis's* expression for π.